

pigment-cells of the skin in a variety of young fishes, I now resorted to this method to identify my embryos. Happily we had on board several pelagic fishes alive, which could afford means of comparison; but unfortunately the steamer was shaking too much and rolling too heavily for microscopic observation of even moderately high powers. Nothing, however, should be left untried; and the very first comparison I made secured the desired result. The pigment-cells of a young *Chironectes pictus* proved identical with those of our little embryos.

It thus stands as a well authenticated fact that the common pelagic *Chironectes* of the Atlantic (named *Chironectes pictus* by Cuvier) builds a nest for its eggs, in which the progeny is wrapped up with the materials of which the nest itself is composed; and as these materials are living gulf-weed, the fish-cradle, rocking upon the deep ocean, is carried along as an undying arbour, affording at the same time protection and afterward food for its living freight.

This marvellous story acquires additional interest if we now take into consideration what are the characteristic peculiarities of the *Chironectes*. As its name indicates, it has fins like hands; that is to say, the pectoral fins are supported by a kind of prolonged wrist-like appendages, and the rays of the ventrals are not unlike rude fingers. With these limbs these fishes have long been known to attach themselves to seaweed, and rather to walk than to swim in their natural element. But now that we have become acquainted with their mode of reproduction, it may fairly be asked if the most important use to which their peculiarly constructed fins are put is not probably in building their nest.—*Silliman's American Journal*, Feb. 1872.

*Morphology of Carpellary Scales in Larix.* By THOMAS MEEHAN.

The facts which I have from time to time contributed, verbally or in papers, to the Academy, in regard to longitudinal series of axillary buds and adnate and free leaves in Coniferous plants, will, I believe, explain something of the structure of the flowers of Coniferæ, which, if not quite distinct from any view before taken, will at least have reached the conclusion by an original line of argument.

I have shown that in the cases where there are longitudinal series of buds, one of the buds, and generally the upper supraaxillary one, is the largest. So far as this longitudinal series of buds is concerned, I find by extensive observation that there are very few of our American trees or shrubs which do not produce them under some circumstances, although they are more generally apparent in some than in others. In many cases they do not break quite through the cortical layer, but continue to grow from year to year, just as the wood grows, always remaining just under the outer bark. It is from these concealed but living buds that the flowers of the *Cercis*, or the spines of *Gleditschia*, will often appear from trunks many years old. In *Magnolia* and *Liriodendron* these concealed buds are easily detected by a thin shave of the outer bark with a sharp knife. In very vigorous shoots of the latter, a series of two (one supraaxillary) is not rarely found prominently above

the bark. In many cases one of these buds, usually the lower and really axillary one, never pushes into growth. In *Gymnocladus* neither upper nor lower would probably ever push, only for the fact that it matures no terminal bud, and thus the laterals have to renew the next season's growth. But for this, *Gymnocladus* would go up like a palm, or, more familiarly, as *Avatia spinosa* does, without a single branch. Failing in the terminal, but two laterals push, giving the branches their dichotomous character. The two which push are always the upper ones in the series of 2, 3, or 4 which appear in this species.

The purpose of this duplication of axillary buds will interest all who study this part of botany. I find that they are not for the duplication of parts, but are separately organized from one another. Thus in *Crataegus* and *Gleditschia* the upper bud produces a spine, the lower is organized to grow as an axillary shoot the next season. But the best illustration of the distinctive organization is in those cases where both upper and lower buds sometimes push the same season, as in *Itea*, *Lonicera*, *Caprifolium*, or *Halesia*. Here we find that one is organized for floral organs, and the other for axillary prolongation. The upper bud always has the same function, and the lower its own, in the same species.

A flower being a modified branch, in which the bract is the leaf and the peduncle the axillary bud, it follows that the laws of axillary stem-production will be more or less reproduced in the inflorescence.

Referring, now, to my paper on adnation in Coniferae, we found that the true leaves of many genera in this order were adnate to the stem, forming what some botanists have termed *pulvini*, or cushions, under the fascicles of some species of *Pinus*, and that what are commonly called leaves, the "needles," are really phylloidal shoots. An examination of *Abies excelsa* will show that the upper portion of the needle has a different origin from the lower adnate portion, or pulvinus, and that in all probability it is a modification of the phenomenon referred to in *Gymnocladus* and other plants, of a longitudinal string of buds, in which the upper is of a different organization from the lower one. In *Larix* it was shown that in the verticils, or perhaps more properly spurs or clusters, the true leaves were free, while in the elongated axis they became for most of their length adnate with the stem, forming the spatulate scales we find peel off the two-year-old wood.

At the flowering-time of the larch, the male and female flowers proceed from the termination of the spurs—not merely "of the preceding year," according to Gray's 'Manual,' but in some cases of many preceding years, "the sterile from leafless buds, the fertile mostly with leaves below" (Gray's 'Manual,' 5th ed. p. 472). Why have the female flowers leaves under them, and the male none? Comparing the male and female catkins, we see why. The scales of the male are formed out of the leaves which become fully formed in the female one. The pair of anther-cells are thus simply on the back of a transformed leaf, just as we find the spore-cases of ferns borne in the same way. The weaker organization

which I have shown in my paper and communications on sex, permits no further development here. But in the case of the female flower the leaf maintains a separate organization all through the catkin or cone; and, as shown in my paper on the stipules of *Magnolia*, the midrib of the leaf shortens, and, assuming a stipular character, increases in width, until we have the purple bractæ so well known in *Larix*. As soon as these bractæ have been arrested in their development, the carpellary scales, which answer to the phylloidal fascicles of *Pinus*, commence their growth in most species of larch, finally equalling the bracts in length.

Whether or not the ovules which appear in the axis of the carpellary scales again result from a third longitudinal bud, I have no evidence; what I have proposed to myself in this paper is simply to show that the scales in the male catkin of *Larix* are modified true leaves; while in the female they arise from buds of another organization, being the metamorphosed secondary leaves, or phylloidal shoots, as I term them, of other Coniferous genera.—*Proc. Acad. Nat. Sciences of Philadelphia*, 1871, pp. 106–108.

*Supplementary Note on the Genus Lichenocrinus.* By F. B. MEEK:

Since writing the remarks published in the October number of the *American Journal*\*, I have received from Mr. Dyer a very complete suite of specimens belonging to the two known species of this curious type. One of these specimens seems almost to demonstrate that the long, slender, column-like appendage mentioned in the descriptions cannot correspond to the ventral tube or so-called proboscis of crinoids. This specimen is a small individual of *L. Dyeri*, only measuring 0·22 inch in diameter across the disk; yet its column-like appendage measures near 2·80 inches in length, and tapers very gradually and regularly from a diameter of 0·03 inch near the disk, to that of scarcely 0·01 inch near the free end, where it actually appears to taper to a mucronate point. Of course the canal, within so attenuated an appendage, must be extremely minute, and could scarcely have performed the same functions as that of the ventral tube of a crinoid, even if open at the free end, which is at least exceedingly improbable.

The extreme tenuity of the free end of this appendage (which I had already mentioned as an objection to viewing it as a ventral tube) appears to be almost, if not quite, as strong an objection to the suggestion that possibly the disk might have been a root, with the real body attached at the other extremity of the long appendage; since it is scarcely possible that a body could have been supported at the free end of such an extremely slender, hair-like organ as that of the specimen under consideration.

This and some of the other specimens also show that, at least in the species *Dyeri*, this long appendage, although apparently equally divided longitudinally by five sutures along its entire length, does not always have the pieces of which it is composed distinctly alternating and interlocking along these sutures, excepting near the disk.

\* See the 'Annals' for November, 1871, p. 341.